BLUE ROCK
ENVIRONMENTAL, INC.

Mr. Bob Stone
Environmental Health Specialist
Humboldt County Division of Environmental Health
100 H Street, Suite 100
Eureka, CA, 95501

February 3, 2005

FILE COPY

Re: **Constant Discharge Aquifer Test and**
Groundwater Extraction Treatment System Design Report
Dave's 76
1666 Main Street
Fortuna, California
LOP #12708
Project No. NC-20

Dear Mr. Stone,

This report was prepared by Blue Rock Environmental Inc (Blue Rock) on behalf of Mr. Dave Ansley and presents results of the constant discharge aquifer test and transmits groundwater extraction and treatment system design that is based on pilot testing data collected in December 2004, and recommended in the *CAP* dated February 11, 2004.

Background

Site Description

The site is located on Main Street in the City of Fortuna, Humboldt County, California one block north west of the intersection of Main Street and South Fortuna Boulevard (Figure 1). The site is an active service station constructed in 1958 that sells gasoline and diesel fuel. Onsite improvements consist of a single story building, two dispenser islands and three double wall fiberglass wrapped underground storage tanks (UST). The tank complex contains one 6,000-gallon UST storing premium gasoline, one 12,000-gallon UST storing regular gasoline and one 6,000-gallon diesel UST utilizing four fuel dispensers. Water and sewer services at the site are provided by public utilities. The site is paved with asphalt with the exception of the northwest corner in the vicinity of the former waste oil UST.

Site History

In 1995, one waste oil UST was removed by the station owner. Soil and groundwater samples were not collected by the owner. In March 1999, three 6,000-gallon gasoline USTs located in a complex at the eastern end of the property, and one 2,000-gallon diesel UST located approximately 5 feet west of the south fuel dispenser island were removed by Beacom Construction of Fortuna, California. The removed USTs were replaced with the previously mentioned current UST system.

During UST excavation activities of March 1999, visibly contaminated soil was removed through overexcavation of the tank pits which formerly contained the diesel and gasoline USTs. Approximately 450 cubic yards of petroleum

contaminated soil were removed from the excavations. The soil was stockpiled on site and covered with plastic sheeting. Analytical results of samples collected from the excavations confirmed the presence of gasoline and diesel range hydrocarbons in the soil and groundwater.

The excavation was deepened below first encountered groundwater. Groundwater was encountered in the excavations at a depth of approximately 5.5 feet below ground surface (bgs). Groundwater was pumped from the excavation into an onsite holding tank. In April 1999, Clearwater Group (Clearwater) installed an aeration system onsite and groundwater in the holding tank was aerated by pumping air into the standing water. This was performed to volatilize some of the existing hydrocarbons prior to offsite disposal. Aerated groundwater was subsequently disposed of offsite by a licensed contractor. As previously mentioned, the new USTs were installed in the existing excavation. The excavation associated with the diesel UST was subsequently backfilled with clean imported gravel.

Site Investigation and Corrective Action History

In September 2000, Clearwater supervised Denbeste Trucking of Windsor, California in the removal of soil generated during the overexcavation activities of March 1999. Approximately 724 tons of petroleum impacted soil was transported to Forward Inc. in Manteca, California. Soil below the former stockpile was sampled per Humboldt County Division of Environmental Health (HCDEH) requirements.

On January 8, 9, and 12, 2001, Clearwater supervised Clearheart Drilling of Santa Rosa, California in the drilling of 11 soil borings. On February 14, 2001, three 2-inch monitoring wells (MW-1 to MW-3) were installed in accordance with Clearwater's *Revised Subsurface Investigation Workplan* dated November 3, 1999. Well construction details are presented in Table 2. Data collected during this phase of investigation confirmed the presence of gasoline, diesel and motor oil range hydrocarbons in soil and groundwater at the subject site. Results of the subsurface investigation are presented in Clearwater's *Subsurface Investigation Report* dated March 22, 2001.

On November 15, 2001, Clearwater supervised Mitchell Drilling Environmental (MDE) of Rancho Cordova, California in the installation of five 2-inch diameter monitoring wells (MW-4, through MW-8) in accordance with Clearwater's *Plume Delineation Workplan / Sensitive Receptor Survey* dated July 19, 2001. Results of the subsurface investigation are presented in Clearwater's *Additional Investigation and Fourth Quarter 2001 Quarterly Monitoring Report* dated January 10, 2002.

On June 10, 2002, Clearwater supervised MDE in the installation of four 2-inch diameter monitoring wells (MW-9, through MW-12) in accordance with Clearwater's *Workplan for Additional Investigation* dated April 8, 2002. Results of the subsurface investigation are presented in Clearwater's *Additional Investigation and Second Quarter 2002 Quarterly Monitoring Report* dated July 31, 2002.

On October 11, 2002, Clearwater supervised MDE in the installation of two 2-inch diameter monitoring wells (MW-13 and MW-14) in accordance with Clearwater's *Workplan for Additional Investigation* dated August 30, 2002. Results of the subsurface investigation are presented in Clearwater's *Additional Investigation and Fourth Quarter 2002 Quarterly Monitoring Report* dated November 25, 2002.

In accordance with Clearwater's *Workplan for Additional Investigation* dated February 20, 2003, Clearwater supervised MDE in drilling four 8-inch diameter soil borings on June 10, 2003 (MW-15 through MW-18). Results of the subsurface investigation are presented in Clearwater's *Additional Investigation and Third Quarter 2003 Groundwater Monitoring Report* dated August 5, 2003.

On February 11, 2004, Clearwater submitted a *Corrective Action Plan* (CAP) to the HCDEH. In a letter dated February 23, 2004 the HCDEH concurred with the proposed remedial action contained in the CAP. In the letter, the HCDEH recommended abandonment of MW-1, MW-2, and MW-4 prior to implementation of the proposed excavation activities. In May 2004, Blue Rock was retained by Mr. Ansley to continue site work. MW-1, MW-2, and MW-4 were destroyed per HCDEH request in June 2004.

Between the dates of October 19 and October 29, 2004, Blue Rock and Van Meter Construction completed remedial activities associated with the removal and disposal of 790 tons of contaminated soil and approximately 4,000 gallons of groundwater associated with the former UST fuel system at the subject site. Blue also installed one groundwater extraction trench for future connection to a remedial compound.

On October 22, 2004, Blue Rock proposed to relocate the position of proposed extraction trench EX-1. The proposed change was based on subsurface conditions, logistics and cost. The HCDEH concurred with this proposal in a letter dated October 26, 2004. Upon completion of the excavation activities described above Blue Rock prepared and submitted a *Remedial Report of Findings* dated November 12, 2004.

Purpose and Scope

The purpose of this current phase of work and the activities associated with it was to perform a constant discharge aquifer test on the recently installed groundwater extraction basin (EX-1) in order to develop a groundwater extraction and treatment system design.

Field Activities

Groundwater Extraction Trench Installation

As stated in Blue Rock's *Remedial Report of Findings* dated November 12, 2004 one groundwater extraction trench was constructed immediately north of the current UST farm during the excavation activities performed in October 2004 (Figure 2).

The extraction trench was constructed with new sch. 40 PVC well casing materials as shown in Figure 3. The trench was filled with 3/4 to 1 inch clean drain rock to 15 feet bgs and completed with river run gravel and base rock. A concrete well vault was set into cement grout for wellhead protection and return piping was stubbed through the vault and completed to the proposed remedial compound location.

The Extraction trench (EX-1) was installed while backfilling the excavation. Extraction trench EX-1 is essentially an extraction basin that has 1,045 ft^2 gravel pack (Figure 4).

Constant Discharge Aquifer Test

On December 20, 2004, Blue Rock performed an aquifer test on recently installed extraction trench (EX-1). This testing was performed to determine how the trench would perform under a constant pumping rate. The extraction trench was designed with a significant amount of filterpack, as described above, to enhance flow from water bearing units. Before the test was initiated, depth to water was measured in all wells at the site. For the test, an electric submersible pump was submerged near the bottom of the well and plumbed to a temporary above ground storage tank. The test was started and maintained at a pumping rate of approximately 5 gpm. During the test, depth to water measurements were obtained from wells at the site, and two samples of extracted water were collected for chemical analysis.

Aquifer testing on EX-1, based on current groundwater elevation, determined that it takes approximately 11 hours at 5 gpm to remove all groundwater above the pump inlet. An estimated 3,800 gallons of groundwater was present in EX-1 prior to initiation of pumping. A total of 1,800 gallons of groundwater were removed during this test which was run for approximately 5 hrs. Extraction basin EX-1 has a current recharge rate of 0.21 feet per hour and approximately 5 feet per day.

No separate-phase hydrocarbons were observed during pilot testing of EX-1. Discharge groundwater samples collected near the end pumping activities of EX-1 determined concentrations of TPHg (400 µg/L), benzene (16 µg/L) and MTBE (160 µg/L) (Table 1).

Results of Constant Discharge Test and Data Analysis

The constant discharge test was run for approximately 5 hours on EX-1 at a flow rate of 5 gpm. By the end of the test, drawdown in EX-1 was approximately 3.1 feet from the pre-test level. Drawdown was observed in all wells monitored during the test. Drawdown observed in neighboring monitoring wells ranged from 0.03 feet in MW-8 to 1.47 feet in MW-7.

The Cooper-Jacob (1946) analytical method was used to determine hydraulic properties of the water bearing zone underlying the site. The Cooper-Jacob method uses observation well drawdown data versus time to calculate transmissivity (T) for a constant discharge test. In this method, drawdown is plotted against the log of time. The difference in drawdown across one log cycle of time is identified from the graph and used in the following equation:

$T\ (gal/day/ft) = 264\ Q / \text{delta}\ S$

where,

Q = pumping rate (gpm)

delta S = difference in drawdown across one log cycle of time (ft)

In this method, transmissivities were calculated using drawdown data from observation wells MW-3, MW-5, MW-6, MW-7, MW-9, and MW-10. The mean transmissivity calculated from the five observation wells is 1,350 gal/day/ft, with a range from 614 to 1,650 gal/day/ft. Pumping well and observation well drawdown curves and transmissivity calculations are included as attachments.

Hydraulic conductivity (K) can be calculated knowing transmissivity and water bearing zone thickness in the following equation:

$$K\ (gal/day/ft^2) = T / b$$

where,

T = transmissivity (gal/day/ft)
b = water bearing zone thickness (ft)

During recent remedial excavation, the water bearing zone was observed to be a few silty and clayey gravels beds, less than 5 feet thick, at depth at a depth of approximately 18 feet bgs. For the purpose of this calculation, the water bearing zone thickness is assumed to be 5 feet. Assuming this thickness, the hydraulic conductivity for the site is 269 gal/day/ft^2. This value correlates well with known hydraulic conductivities for sandy silts and sands, which is relatively consistent with the silty and clayey gravel beds identified as the water bearing zone (Freeze and Cherry, 1979).

The Specific Capacity (SC) of a well is defined as drawdown per flowrate. This can be approximated by dividing the pumping rate by the total drawdown in the pumping well, assuming that well loss created by turbulent flow through the well screen is negligible (Freeze and Cherry, 1979). Using the drawdown and flowrate mentioned above, the SC of EX-1 is calculated as 0.62 feet/gpm. This number is useful in predicting drawdown in the recovery well at various pumping rates. At the time of the test, approximately 10 feet of water was present in EX-1, and pumping at 5 gpm resulted in a little more than 3 feet of drawdown.

Groundwater extraction is typically employed to control plume migration. The potential for this can be assessed by calculating the zone of capture for the pumping well. Keely and Tsang (1983) developed equations to quickly calculate the zone of capture from a well for given values of flowrate, transmissivity, and hydraulic gradient.

The equation for the downgradient stagnation point from the pumping well is summarized as:

$$X_s\ (ft) = Q / 2 \pi T i$$

where,

Q = pumping rate (ft^3/day)
T = transmissivity (ft^2/day)
i = hydraulic gradient (unitless)

The equation for the width of upgradient capture from the pumping well is summarized as:

$$W\,(ft) = Q / T\,i$$

where,

Q = pumping rate (ft^3/day)
T = transmissivity (ft^2/day)
i = hydraulic gradient (unitless)

Using the mean transmissivity presented above, a hydraulic gradient of 0.015 in the area of the site, and the flowrate of 5 gpm, the downgradient stagnation point from EX-1 is approximately 60 feet, and the width of total cross gradient capture point is approximately 370 feet (Figure 5). This shows that pumping solely from EX-1 at 7 gpm will likely capture all of the groundwater on-site and, perhaps, slightly into Main Street.

Remedial Scope of Work

The following is a list of tasks that will be completed by Blue Rock for groundwater extraction remediation based on pilot testing data presented above.

Permitting

Blue Rock will obtain the following permits:

- Discharge permit from the City of Fortuna for discharging treated groundwater to local sewer.
- City of Fortuna Building Department permit for electrical installation.
- North Coast Unified Air Quality Management District (one time system inspection, if needed).

Health and Safety

Blue Rock will submit a Community Health and Safety Plan to the HCDEH that will include groundwater extraction remedial activities.

Blue Rock will prepare Health and Safety Plans for site work activities as needed or required.

Site Construction

In order to install the skid mounted GWE system, the following construction activities will need to be completed.

- Construction of a 10'x 15' fenced remediation compound.
- Discharge piping will be installed to the nearest sewer per City requirements.
- Electrical wiring and 40 amp sub panel from existing 200 amp main panel.

Extraction System Design and Equipment

The groundwater extraction system is designed to operate at a 5 gpm to 10 gpm flow rate and controlled by a network of water level float switches. The following is a list and description of equipment that will be used.

- 4 ft by 8 ft equipment skid.
- 1 hp Grundfos submersible pump with a maximum pumping rate of 10 gpm. The wellhead assemblies will include electrical leads, well seal, ball valves, quick connect fittings and riser hoses.
- Piping manifold will be constructed for mechanical controls (including influent sample port).
- Electrical panel will be installed off existing main electrical panel. A complete electrical system including all the necessary breakers, environmental controls, and emergency controls will be installed to operate the remedial system safe and effectively. Figure 4 details the single line diagram for this system.
- One 75 gpm 150 psi bag filter will be installed as shown on Figure 6. This filter will be installed with inlet and outlet valves, pressure gauges, and a differential pressure switch.
- Control panel will be fabricated and installed to control all pumping operations. The panel will be a 24"x 30" NEMA 12 enclosing the following controls: (1) emergency stop push button, (2) hand off auto switch, (2) submersible pump motor starters, (1) transfer pump motor starters, pump fuses, transfer pump level controls, an alarm light, a run light, a master relay and (2) alarm relays. A high level shutdown will be installed in the tank.
- One 300 gallon storage tank and 3/4 hp transfer pump will be installed as shown on Figure 6. The motor shall be TEFC continuous duty. The discharge rate will be 10 gpm at 10 psi.

Treatment System Design and Equipment

In order to discharge into the City of Fortuna sewer system, Blue Rock has designed a carbon treatment system to achieve complete hydrocarbon adsorption.

A liquid isotherm report was created based on pilot testing analytical data and determined that the carbon adsorption rate would be 2.11 pounds of carbon per 1,000 gallons of groundwater treated. Based on subsurface conditions and pilot testing data, Blue Rock estimates that pumping from EX-1 will, at times, dewater the basin. This will result in episodes of pumping, which will reduce the long-term average pumping to a range possibly between 1.5 to 3 gpm. Using these rates, Blue Rock estimates that, on average, approximately 65,000 to 120,000 gallons of groundwater will be treated per month. Therefore, carbon consumption would range from approximately 138 to 250 pounds per month.

Based on isotherm and anticipated pumping rates, Blue Rock has selected to use (2) 1,000 pound carbon vessels in line. This will allow for approximately 12 months of use before breakthrough, which will minimize the expenses associated with carbon change out services.

Treated Discharge and Compliance

Blue Rock has planned for treated groundwater to discharge into local sanitary sewer under the authority of City of Fortuna that requires the collection of target analyte samples which would be analyzed for TPHg/BTEX/MTBE by EPA Method 5030/8260B. Initial start-up compliance samples would be collected from a sample port located after the second carbon vessel and before discharging into the sewer. These initial start-up samples will be analyzed per requirements set forth in the discharge permit.

Monthly Operations and Maintenance

Blue Rock will perform monthly O & M visits to the site for the collection of remedial and compliance samples. Blue Rock will also review instrumentation for signs of equipment failure and ensure proper functioning of system.

Blue Rock will collect monthly influent and effluent discharge samples for the purpose of calculating hydrocarbon destruction and compliance with applicable permits. These samples will be collected from sample ports located before the storage tank and after the last carbon vessel. These samples will be analyzed for TPHg/BTEX/MTBE by EPA Method 5030/8260B.

Blue Rock will install additional sample ports after each carbon vessel and collect and analyze samples from these ports to forecast breakthrough of hydrocarbons. These samples will be called "mid" samples and it is anticipated that these samples will be collected monthly and analyzed for TPHg/BTEX/MTBE by EPA Method 5030/8260B.

Reporting

Blue Rock will report bi-monthly compliance testing results in a remedial status section of each subsequent quarterly monitoring report. This section of the quarterly report will also include a cumulative hydrocarbon recovery calculation that will be based on concentrations of influent samples and volume of groundwater treated during duration.

Certification

This report was prepared under the supervision of a California Registered Geologist at Blue Rock. All statements, conclusions, and recommendations are based upon published results from past consultants, field observations by Blue Rock, and analyses performed by a state-certified laboratory as they relate to the time, location, and depth of points sampled by Blue Rock or others. Interpretation of data, including spatial distribution and temporal trends, are based on commonly used geologic and scientific principles. It is possible that interpretations, conclusions, and recommendations presented in this report may change, as additional data become available and/or regulations change.

Information and interpretation presented herein are for the sole use of the client and regulating agency. The information and interpretation contained in this document should not be relied upon by a third party.

The service performed by Blue Rock has been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions in the area of the site. No other warranty, expressed or implied, is made.

If you have any questions regarding this project, please contact us at (707) 441-1934.

Sincerely,
Blue Rock Environmental, Inc.

Prepared by:

Andrew LoCicero
Project Scientist

Reviewed by:

Brian Gwinn, PG
Principal Geologist

REGISTERED GEOLOGIST
BRIAN M. GWINN
No. 6508
exp. 4/30/05
STATE OF CALIFORNIA

References

Cooper, H.H., Jr. and Jacob, C.E. (1946). A generalized graphical method for evaluating formation constants and summarizing well field history. *Transactions of the American Geophysical Union*, Vol. 27., pp. 526-534.

Freeze, R.A. and Cherry, J.A. (1979). *Groundwater*. Prentice-Hall, Englewood Cliffs, New Jersey. pp. 604.

Keely, J. and Tsang, L. (1983). Velocity plots and capture zones of pumping centers for groundwater investigations. *Ground Water*, Vol. 21., pp. 701-714.

Attachments:

Table 1	Pilot Testing Groundwater Analytical Results
Figure 1	Site Location Map
Figure 2	Site Plan
Figure 3	Extraction Trench Diagram
Figure 4	Groundwater Extraction Basin Layout
Figure 5	Estimated Capture Zone
Figure 6	Proposed Groundwater Extraction System Schematic
Figure 7	Groundwater Treatment System Single Line Diagram
Appendix A:	Pilot Test Data Charts for Monitoring Well Drawdown vs. Time
Appendix B:	Laboratory Analytical Reports and Chain of Custody

cc: Mr. Dave Ansley
1666 Main St
Fortuna, CA 95540

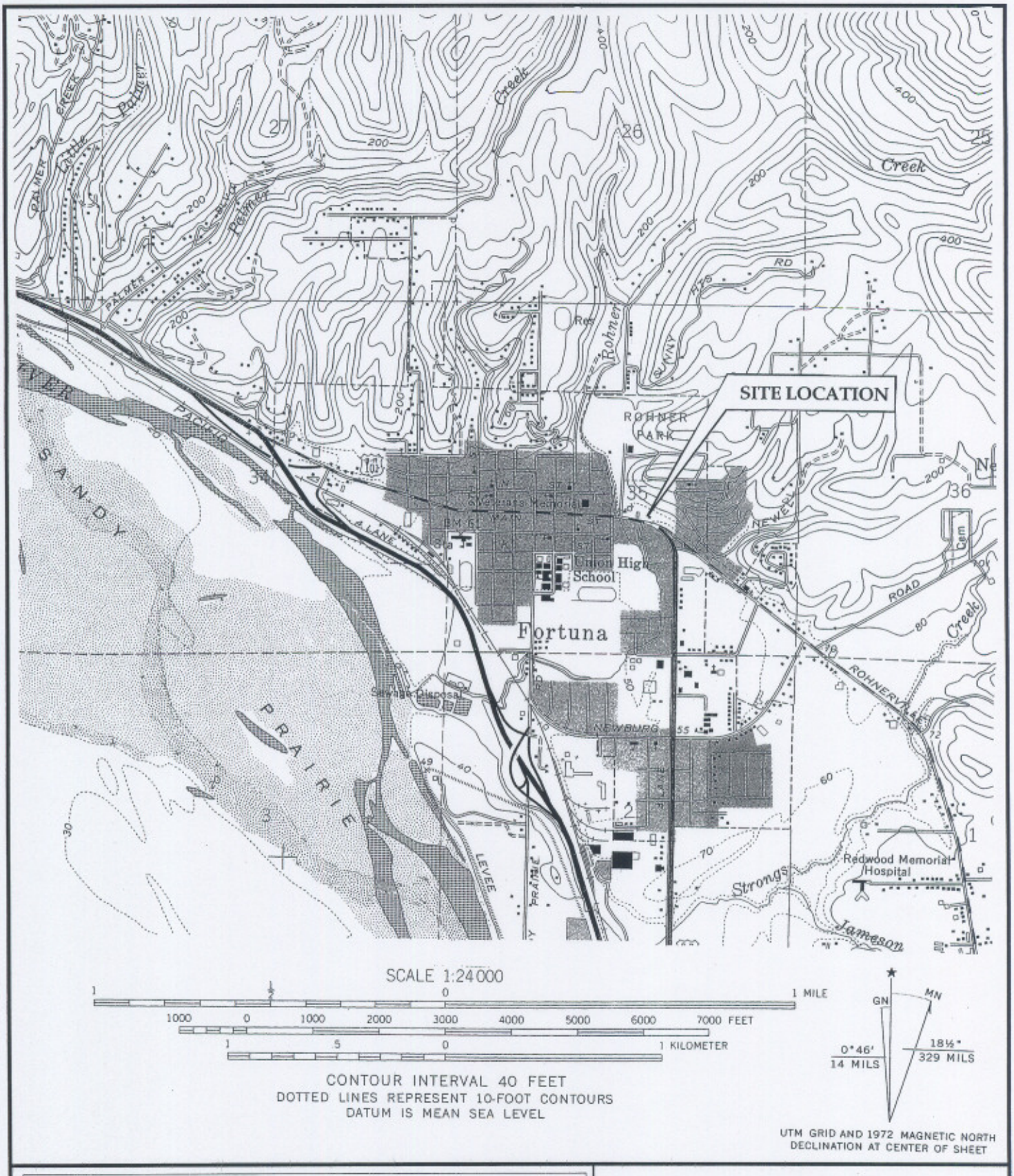
TABLES

Table 1
PILOT TESTING GROUNDWATER SAMPLE ANALYTICAL RESULTS
Dave's 76
1666 Main Street
Fortuna, California
Blue Rock Project # NC-20

Sample ID	Sample Date	TPHg (µg/L)	TPHd (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	MTBE (µg/L)
EX-1 Inf #1	12/20/04	**360**	<50	**14**	**1.2**	**0.93**	**10**	**160**
EX-1 Inf #2	12/20/04	**400**	<50	**16**	**1.3**	**1.1**	**13**	**150**

Notes :
µg/L=micrograms per liter= parts per billion= ppb
TPHg: Total petroleum hydrocarbons as gasoline by EPA Method 5030/8260B
TPHd: Total petroleum hydrocarbons as diesel by EPA Method8015 (silica gel cleanup)
MTBE: Methyl tertiary butyl ether by Method 8260B
Lead: Dissolved Lead by Method 6010B
<###: Not detected in concentrations exceeding the indicated laboratory detection limit

FIGURES

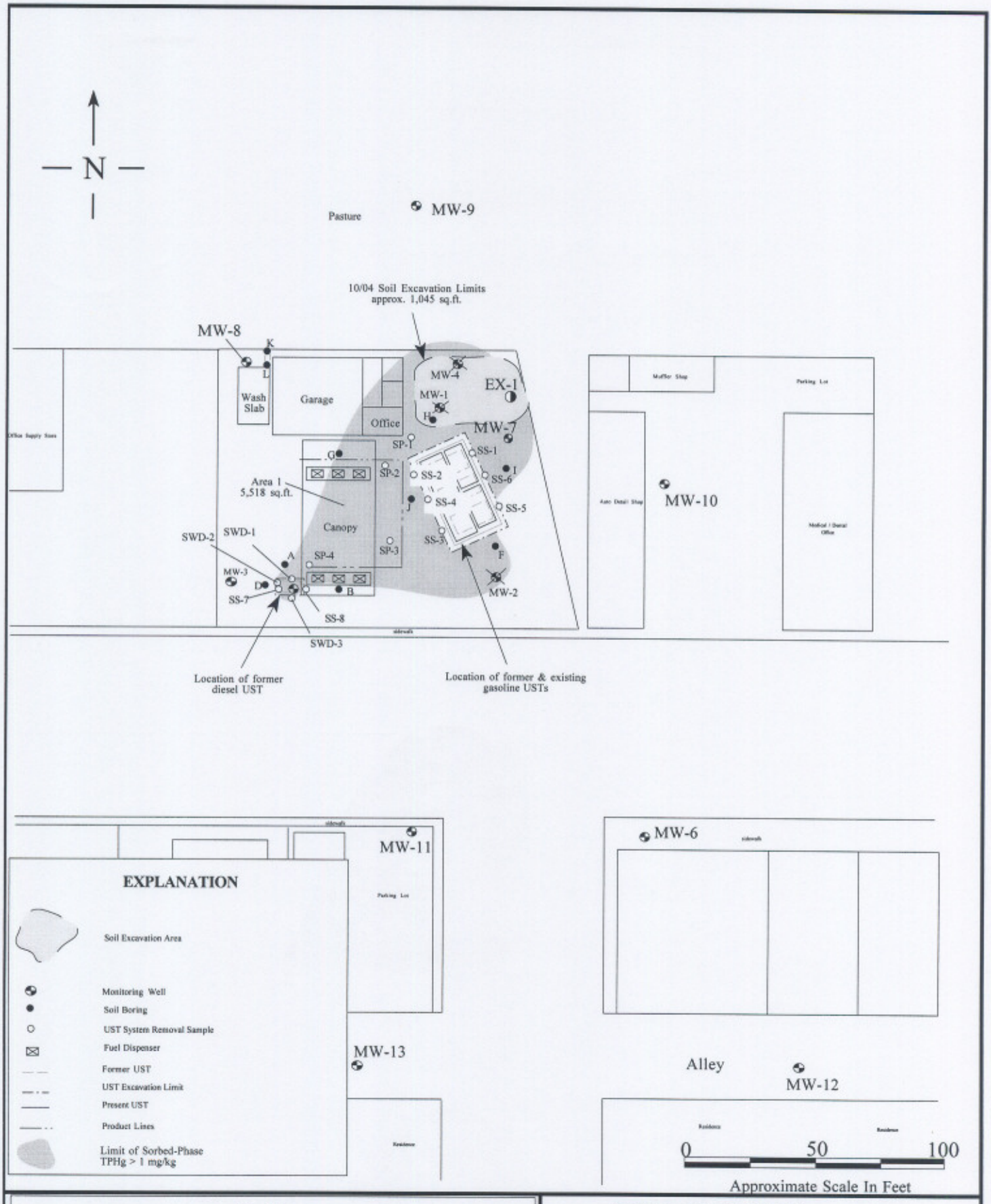


Site Location Map

Dave's 76
1666 Main Street
Fortuna, California

BLUE ROCK ENVIRONMENTAL, INC.

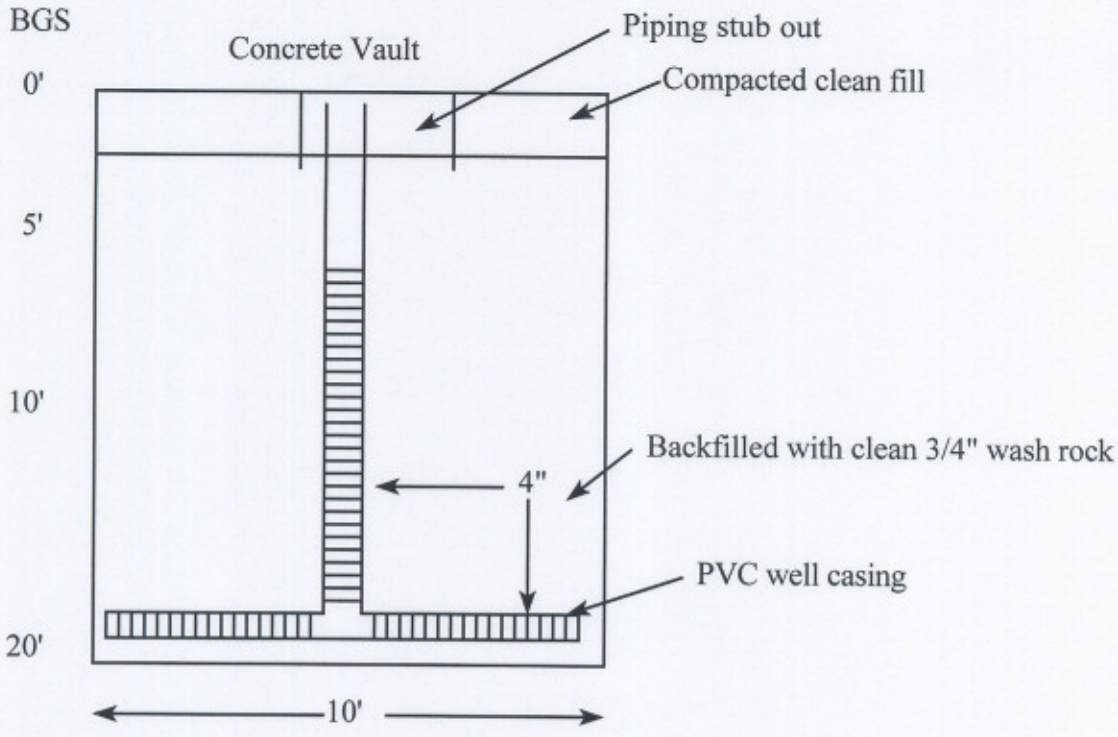
Project No.	Date	Figure
NC-20	**2/05**	**1**

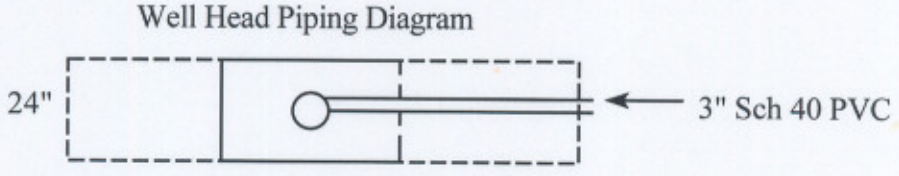


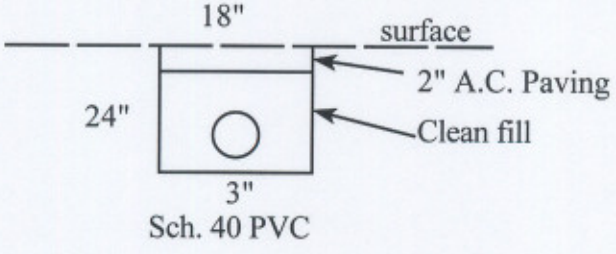
Site Plan
Dave's 76
1666 Main Street
Fortuna, California

BLUE ROCK ENVIRONMENTAL, INC.

Project No.	Report Date	Figure
NC-20	**2/05**	**2**





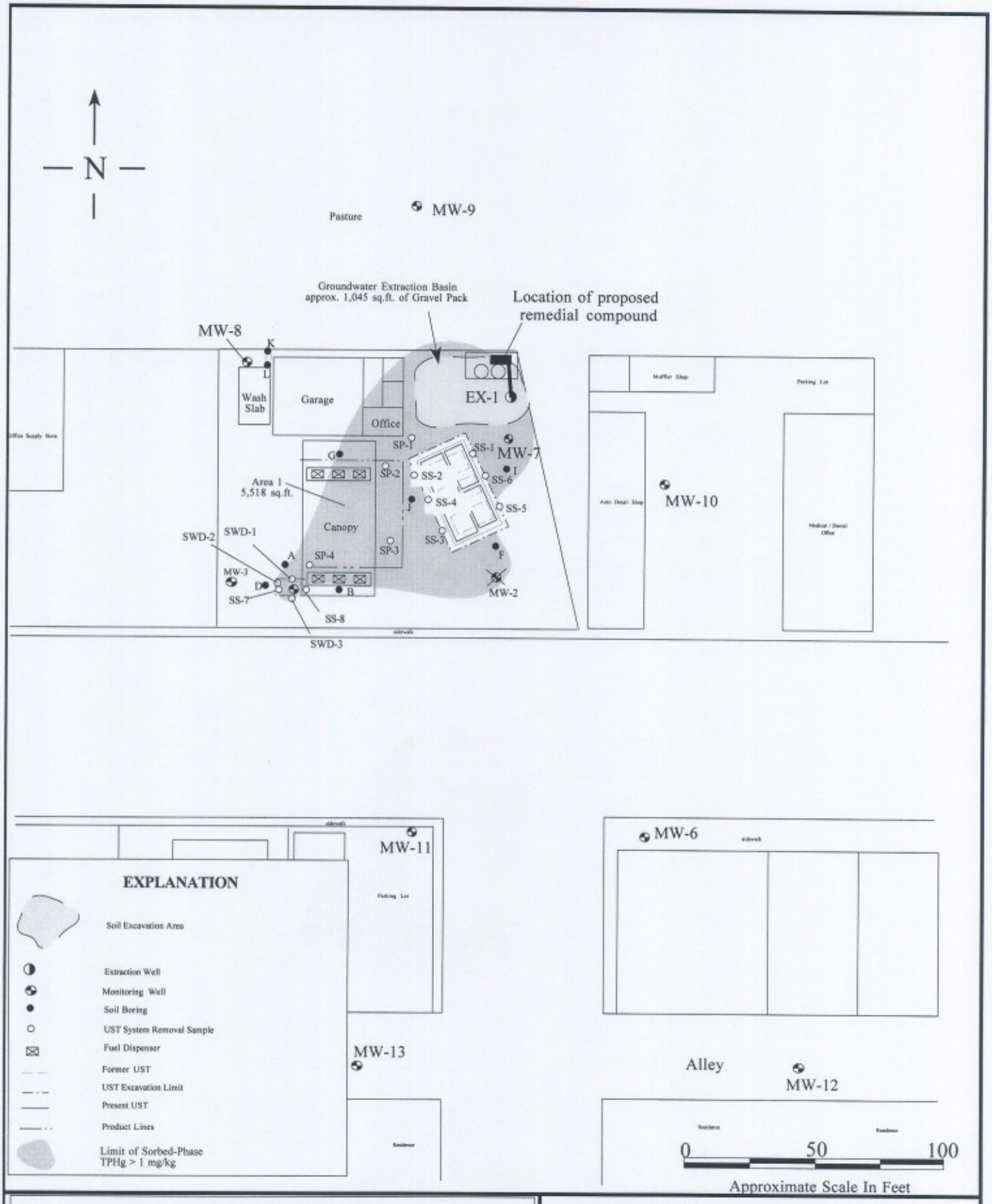


Extraction Trench Diagram

Dave's 76
1666 Main Street
Fortuna, California

BLUE ROCK ENVIRONMENTAL, INC.

Project No.	Date	Figure
NC-20	**2/05**	**3**

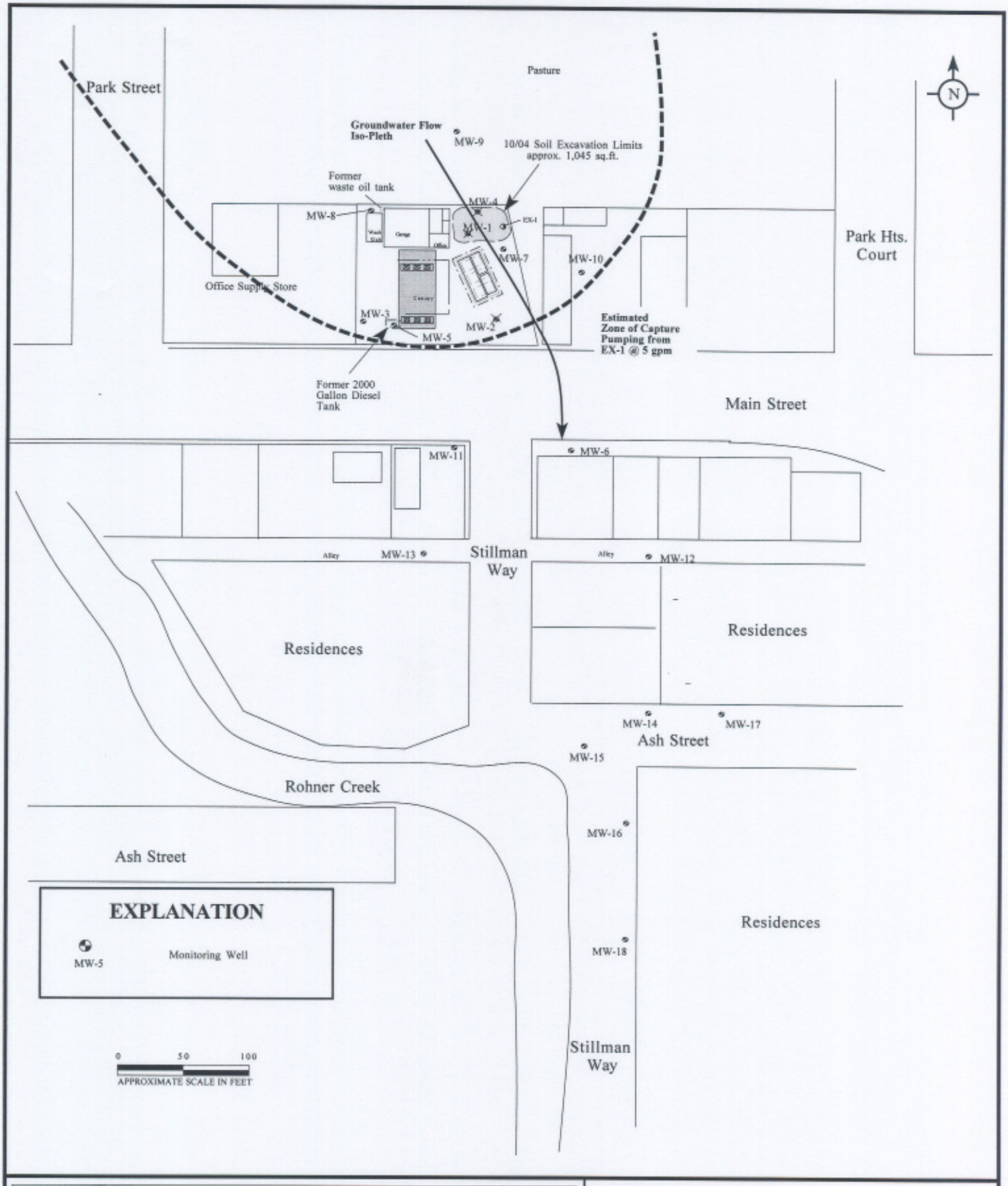


Groundwater Extraction Basin Layout

Dave's 76
1666 Main Street
Fortuna, California

BLUE ROCK ENVIRONMENTAL, INC.

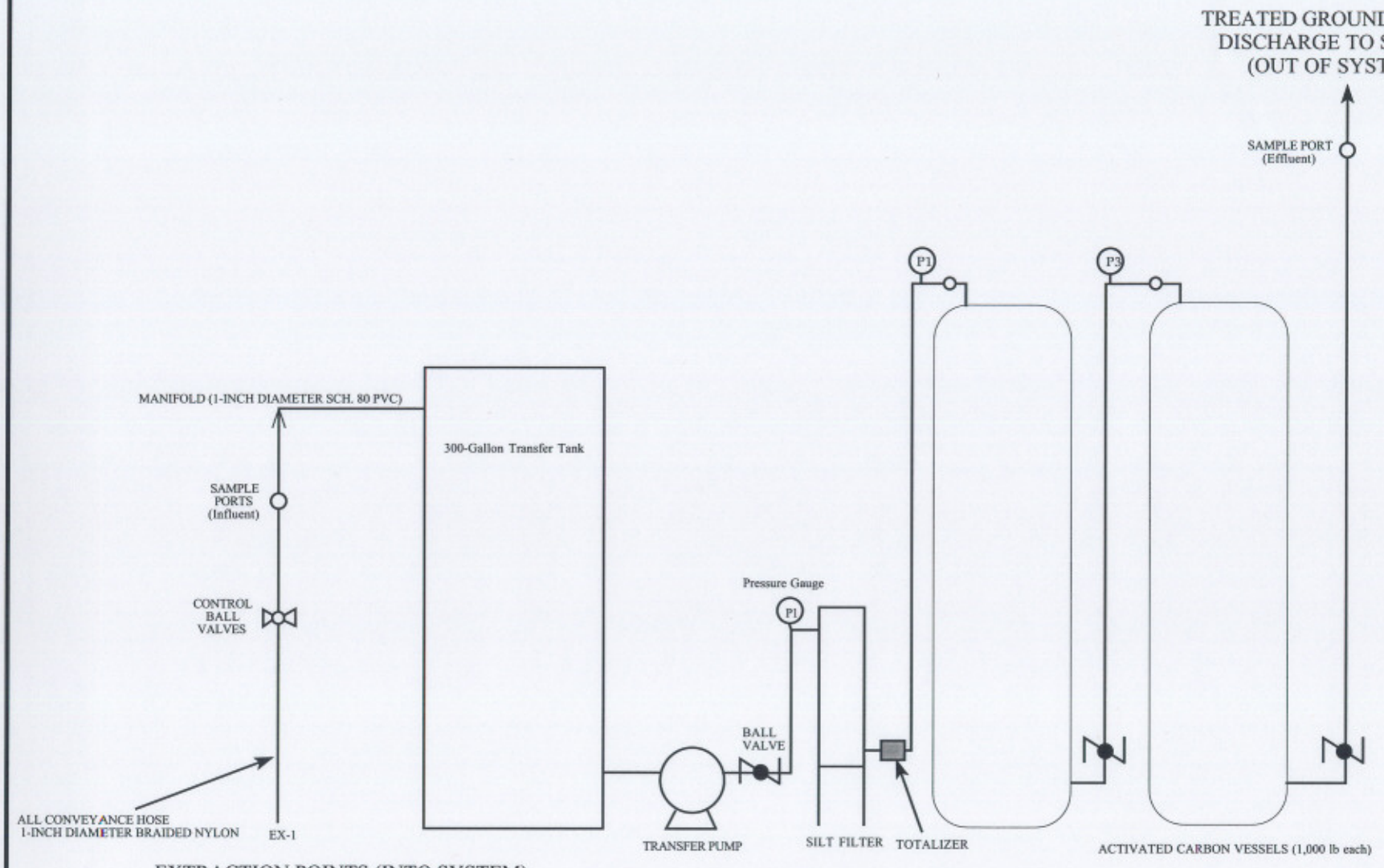
Project No.	Date	Figure
NC-20	**2/05**	**4**



Estimated Capture Zone
Dave's 76
1666 Main Street
Fortuna, California

BLUE ROCK ENVIRONMENTAL, INC.

Project No.	Date	Figure
NC-20	2/05	5

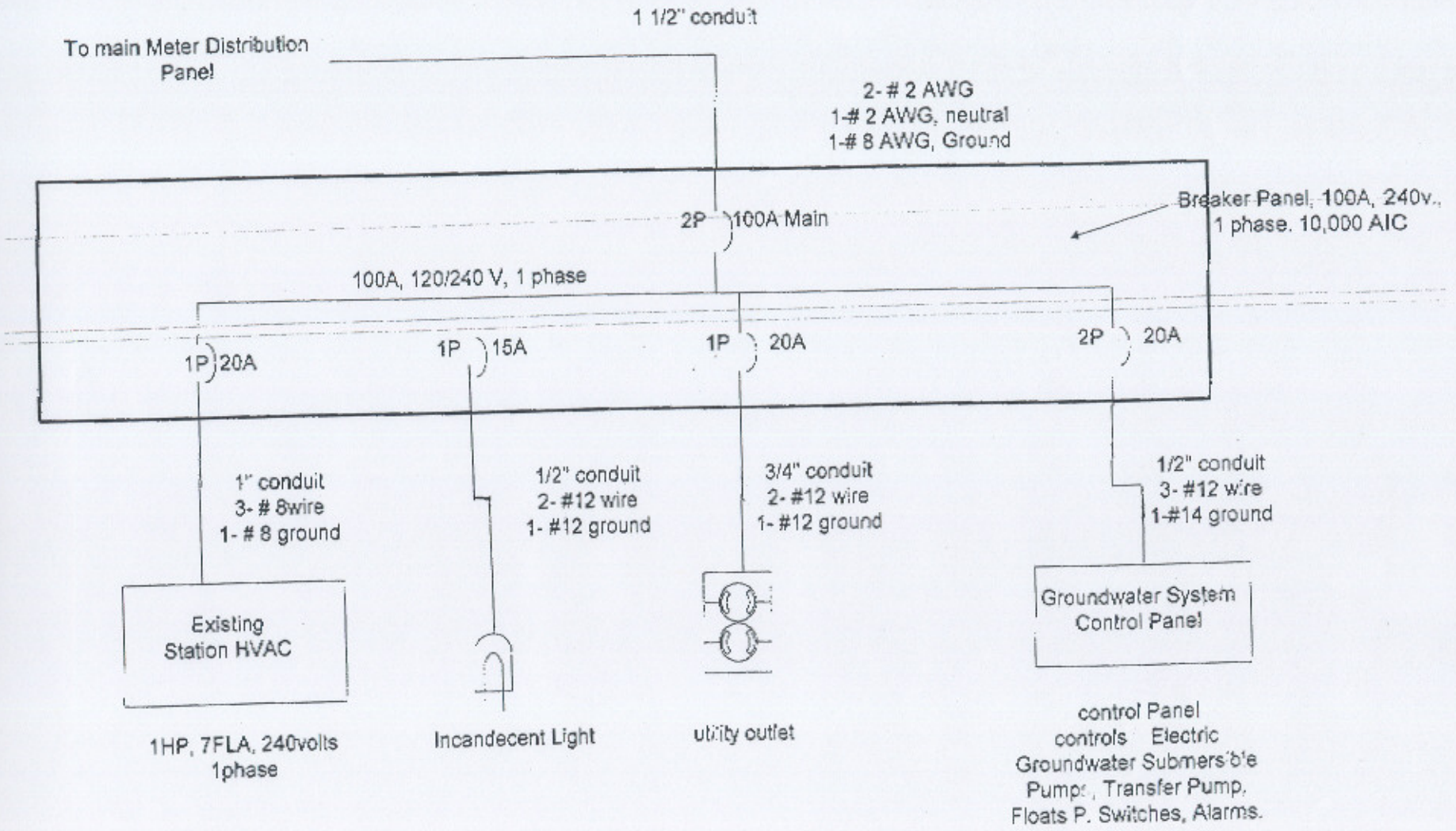


Proposed Groundwater Extraction System Schematic

Dave's 76
1666 Main Street
Fortuna, California

BLUE ROCK ENVIRONMENTAL, INC.

Project No.	Figure Date	Figure
NC-20	**2/05**	**6**



Line diagram prepared by Sustainable Technologies

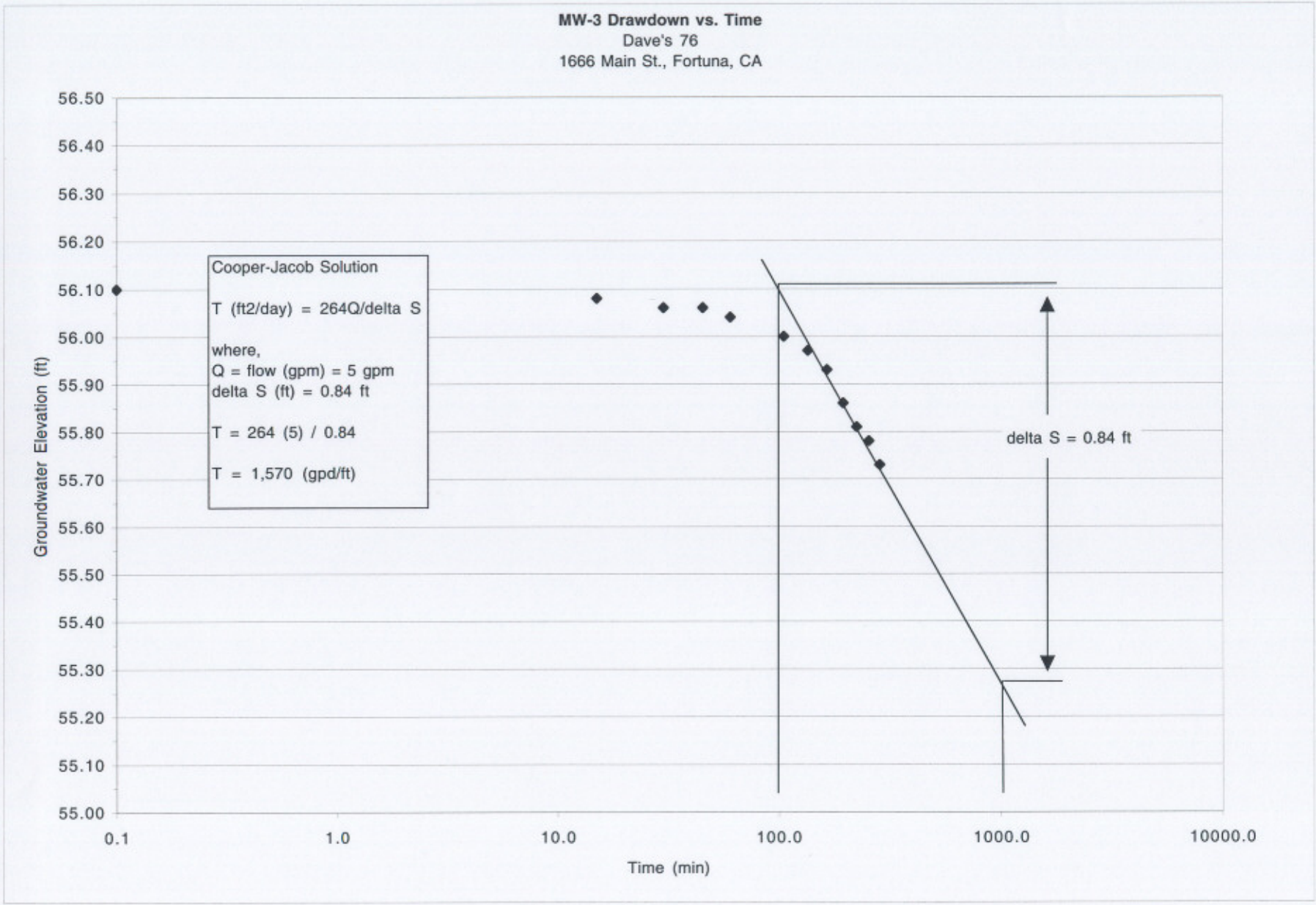
Electrical Line Diagram

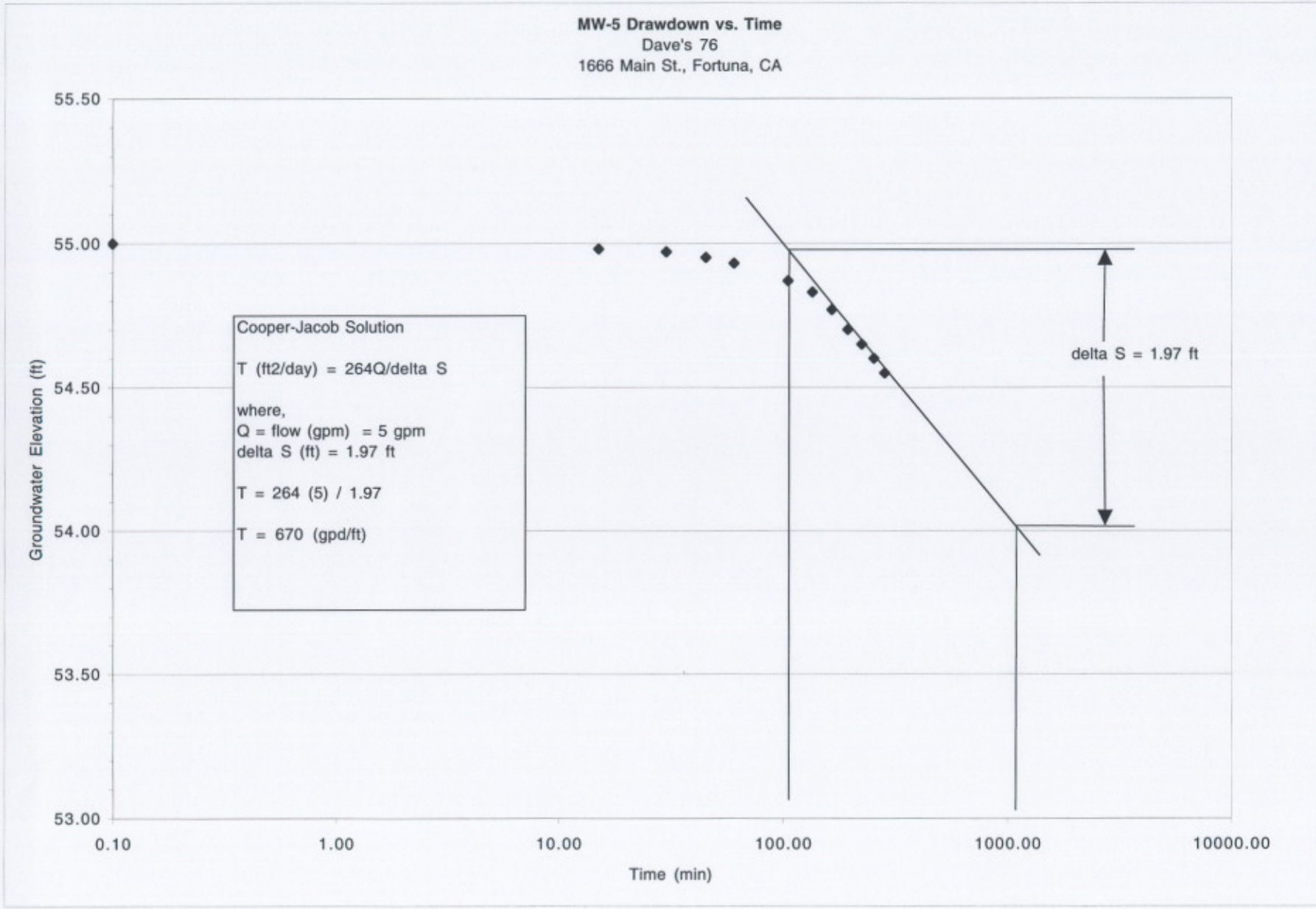
Dave's 76
1666 Main Street
Fortuna, California

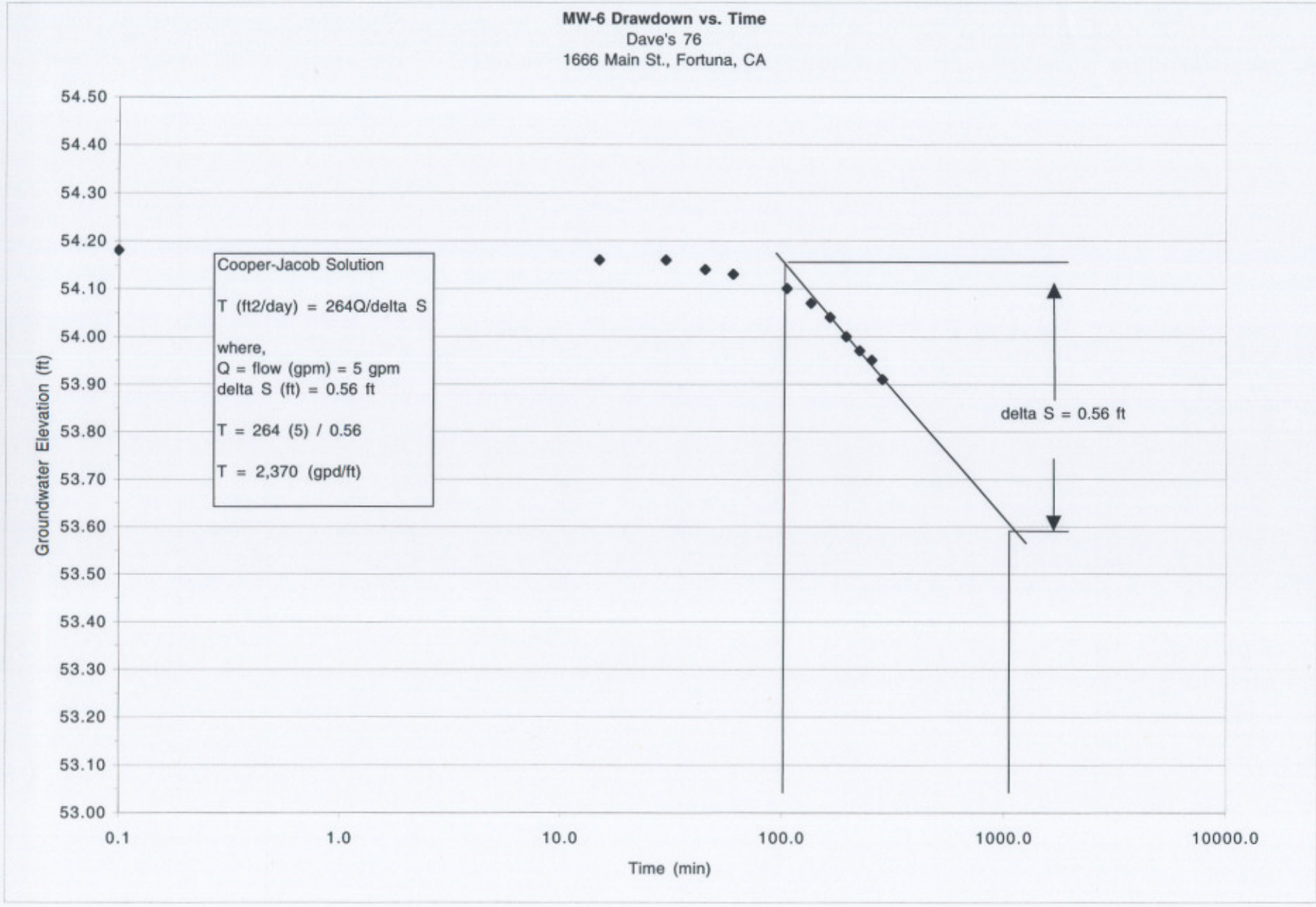
BLUE ROCK ENVIRONMENTAL, INC.

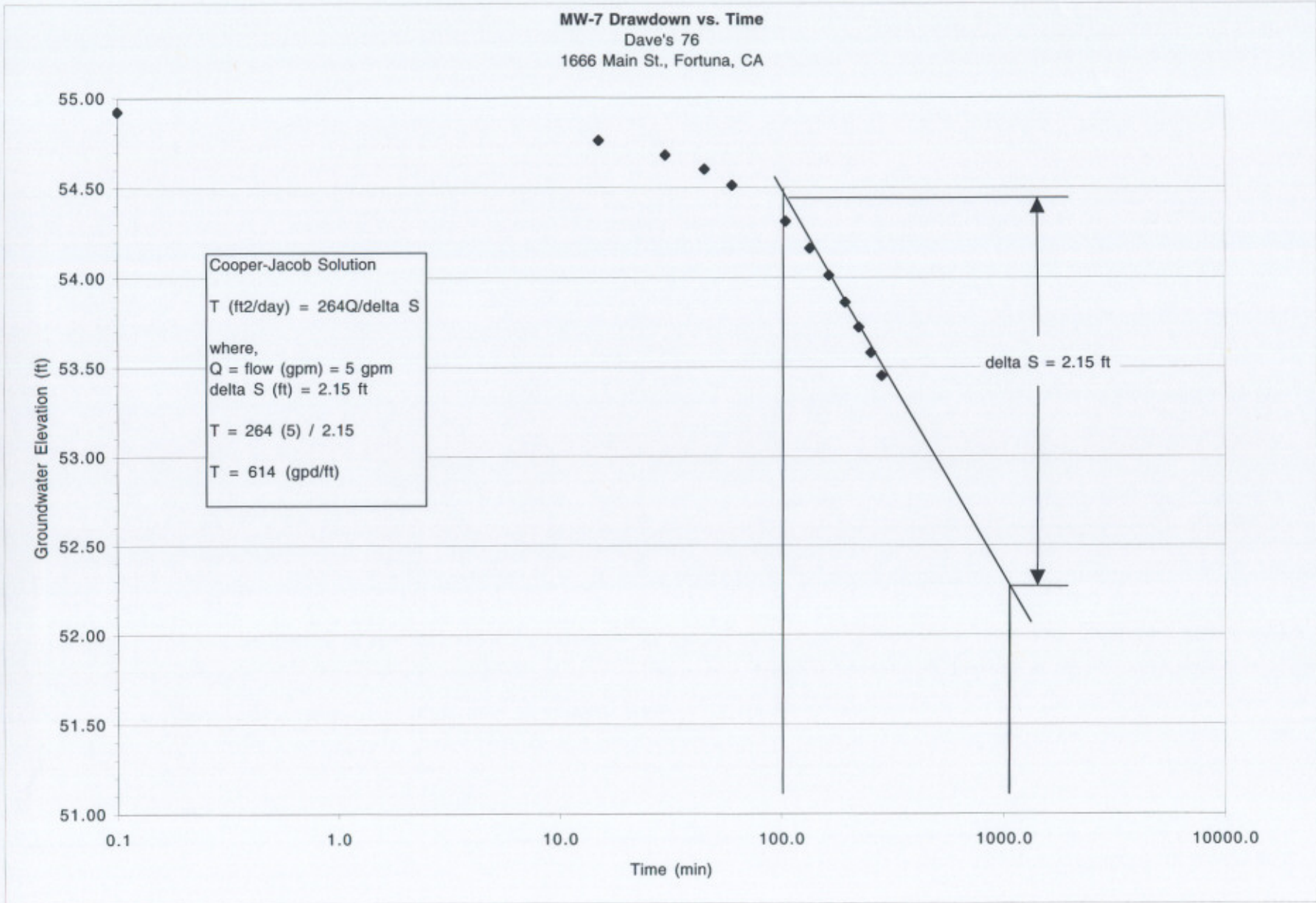
Project No.	Figure Date	Figure
NC-20	**2/05**	**7**

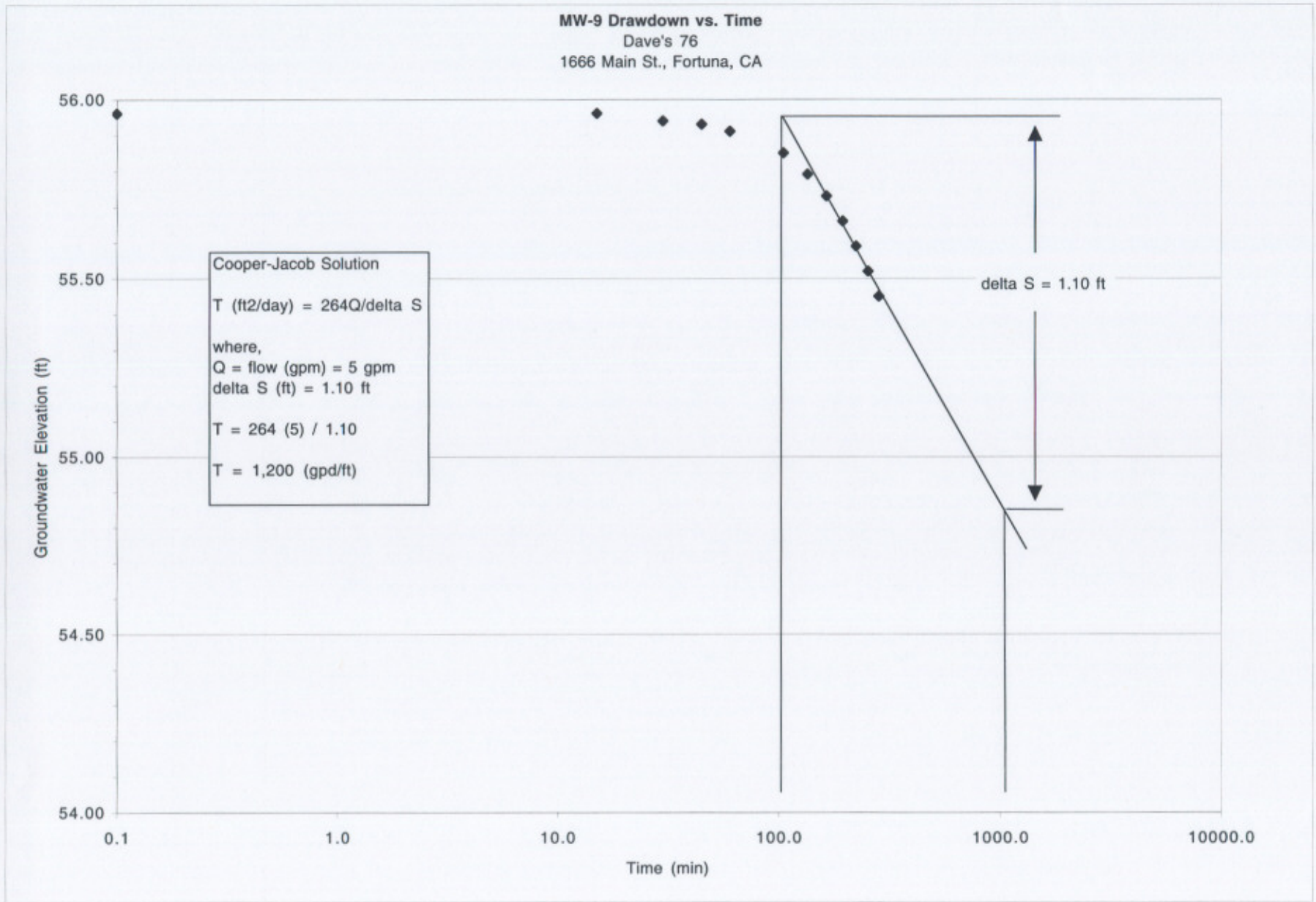
APPENDIX A

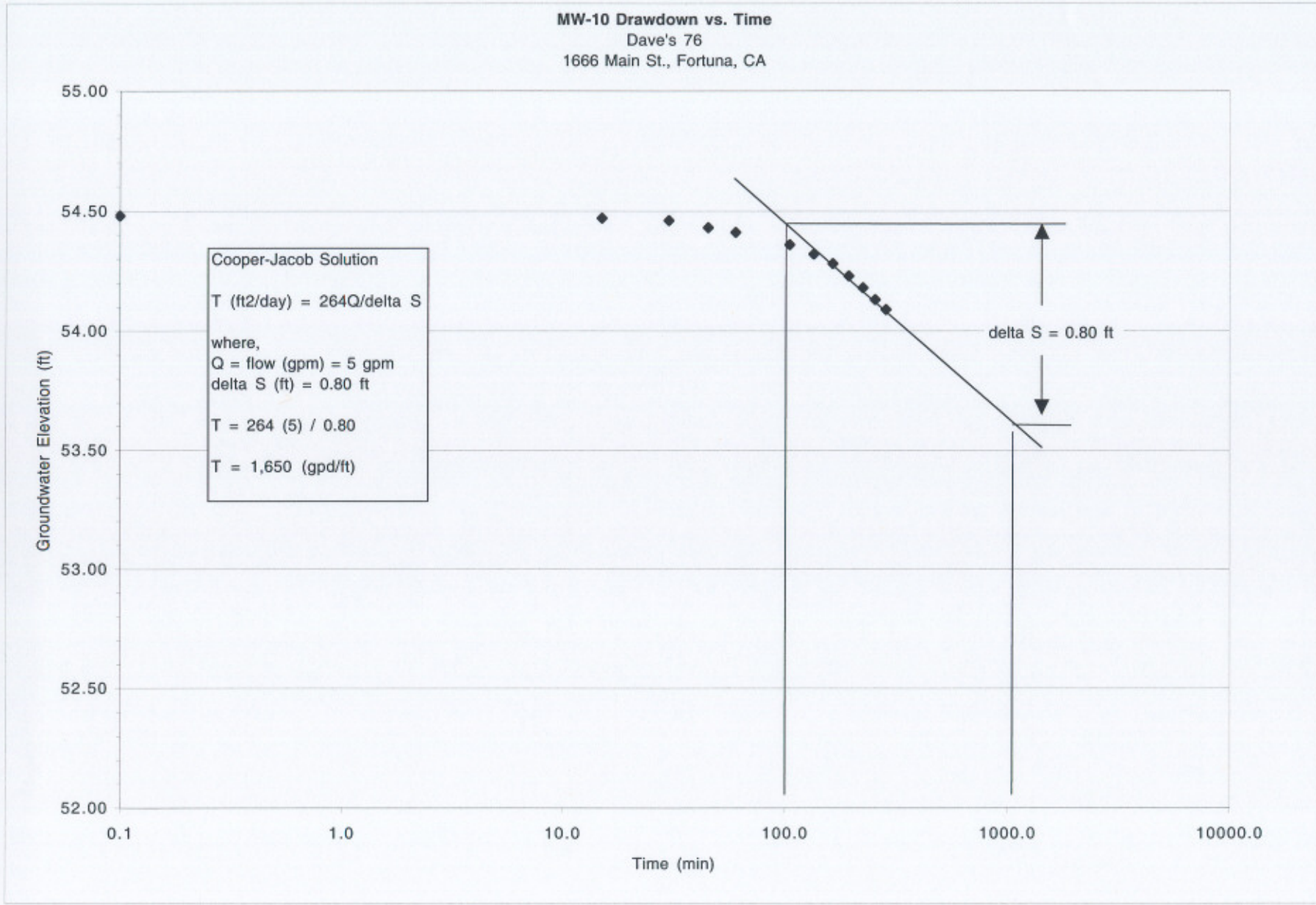

MW-3 Drawdown vs. Time
Dave's 76
1666 Main St., Fortuna, CA
Groundwater Elevation (ft)
56.50
56.40
56.30
56.20
56.10
56.00
55.90
55.80
55.70
55.60
55.50
55.40
55.30
55.20
55.10
55.00
Cooper-Jacob Solution
T (ft2/day) = 264Q/delta S
where,
Q = flow (gpm) = 5 gpm
delta S (ft) = 0.84 ft
T = 264 (5) / 0.84
T = 1,570 (gpd/ft)
delta S = 0.84 ft
0.1
1.0
10.0
100.0
1000.0
10000.0
Time (min)


MW-5 Drawdown vs. Time
Dave's 76
1666 Main St., Fortuna, CA
55.50
55.00
54.50
54.00
53.50
53.00
Groundwater Elevation (ft)
0.10
1.00
10.00
100.00
1000.00
10000.00
Time (min)
Cooper-Jacob Solution
T (ft2/day) = 264Q/delta S
where,
Q = flow (gpm) = 5 gpm
delta S (ft) = 1.97 ft
T = 264 (5) / 1.97
T = 670 (gpd/ft)
delta S = 1.97 ft


MW-6 Drawdown vs. Time
Dave's 76
1666 Main St., Fortuna, CA
Groundwater Elevation (ft)
54.50
54.40
54.30
54.20
54.10
54.00
53.90
53.80
53.70
53.60
53.50
53.40
53.30
53.20
53.10
53.00
0.1
1.0
10.0
100.0
1000.0
10000.0
Time (min)
Cooper-Jacob Solution
T (ft2/day) = 264Q/delta S
where,
Q = flow (gpm) = 5 gpm
delta S (ft) = 0.56 ft
T = 264 (5) / 0.56
T = 2,370 (gpd/ft)
delta S = 0.56 ft


MW-7 Drawdown vs. Time
Dave's 76
1666 Main St., Fortuna, CA
Cooper-Jacob Solution
T (ft2/day) = 264Q/delta S
where,
Q = flow (gpm) = 5 gpm
delta S (ft) = 2.15 ft
T = 264 (5) / 2.15
T = 614 (gpd/ft)
delta S = 2.15 ft
Groundwater Elevation (ft)
55.00
54.50
54.00
53.50
53.00
52.50
52.00
51.50
51.00
0.1
1.0
10.0
100.0
1000.0
10000.0
Time (min)


MW-9 Drawdown vs. Time
Dave's 76
1666 Main St., Fortuna, CA
56.00
55.50
55.00
54.50
54.00
Groundwater Elevation (ft)
0.1
1.0
10.0
100.0
1000.0
10000.0
Time (min)
Cooper-Jacob Solution
T (ft2/day) = 264Q/delta S
where,
Q = flow (gpm) = 5 gpm
delta S (ft) = 1.10 ft
T = 264 (5) / 1.10
T = 1,200 (gpd/ft)
delta S = 1.10 ft


MW-10 Drawdown vs. Time
Dave's 76
1666 Main St., Fortuna, CA
55.00
54.50
54.00
53.50
53.00
52.50
52.00
Groundwater Elevation (ft)
0.1
1.0
10.0
100.0
1000.0
10000.0
Time (min)
Cooper-Jacob Solution
T (ft2/day) = 264Q/delta S
where,
Q = flow (gpm) = 5 gpm
delta S (ft) = 0.80 ft
T = 264 (5) / 0.80
T = 1,650 (gpd/ft)
delta S = 0.80 ft

APPENDIX B

KIFF ANALYTICAL LLC

Report Number : 41674
Date : 1/4/2005

Andrew LoCicero
Blue Rock Environmental, Inc.
535 3rd Street, Suite 100
Eureka, CA 95501

Subject : 2 Water Samples
Project Name : Dave's 76
Project Number : NC-20

Dear Mr. LoCicero,

Chemical analysis of the samples referenced above has been completed. Summaries of the data are contained on the following pages. Sample(s) were received under documented chain-of-custody. US EPA protocols for sample storage and preservation were followed.

Kiff Analytical is certified by the State of California (# 2236). If you have any questions regarding procedures or results, please call me at 530-297-4800.

Sincerely,

Joel Kiff

KIFF ANALYTICAL LLC

Report Number : 41674
Date : 1/4/2005

Subject : 2 Water Samples
Project Name : Dave's 76
Project Number : NC-20

Case Narrative

Matrix Spike/Matrix Spike Duplicate Results associated with samples EX-1 Inf # 1, EX-1 Inf # 2 for the analyte Benzene were affected by the analyte concentrations already present in the un-spiked sample.

Approved By:

Joel Kiff

2795 2nd St, Suite 300 Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 41674
Date : 1/4/2005

Project Name : **Dave's 76**
Project Number : **NC-20**

Sample : **EX-1 Inf # 1** Matrix : Water Lab Number : 41674-01
Sample Date :12/20/2004

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**14**	0.50	ug/L	EPA 8260B	12/30/2004
Toluene	**1.2**	0.50	ug/L	EPA 8260B	12/30/2004
Ethylbenzene	**0.93**	0.50	ug/L	EPA 8260B	12/30/2004
Total Xylenes	**10**	0.50	ug/L	EPA 8260B	12/30/2004
Methyl-t-butyl ether (MTBE)	**160**	0.50	ug/L	EPA 8260B	12/30/2004
TPH as Gasoline	**360**	50	ug/L	EPA 8260B	12/30/2004
Toluene - d8 (Surr)	98.8		% Recovery	EPA 8260B	12/30/2004
4-Bromofluorobenzene (Surr)	104		% Recovery	EPA 8260B	12/30/2004
TPH as Diesel (Silica Gel)	**< 50**	50	ug/L	M EPA 8015	12/27/2004

Sample : **EX-1 Inf # 2** Matrix : Water Lab Number : 41674-02
Sample Date :12/20/2004

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**16**	0.50	ug/L	EPA 8260B	12/30/2004
Toluene	**1.3**	0.50	ug/L	EPA 8260B	12/30/2004
Ethylbenzene	**1.1**	0.50	ug/L	EPA 8260B	12/30/2004
Total Xylenes	**13**	0.50	ug/L	EPA 8260B	12/30/2004
Methyl-t-butyl ether (MTBE)	**150**	0.50	ug/L	EPA 8260B	12/30/2004
TPH as Gasoline	**400**	50	ug/L	EPA 8260B	12/30/2004
Toluene - d8 (Surr)	99.0		% Recovery	EPA 8260B	12/30/2004
4-Bromofluorobenzene (Surr)	106		% Recovery	EPA 8260B	12/30/2004
TPH as Diesel (Silica Gel)	**< 50**	50	ug/L	M EPA 8015	12/27/2004

Approved By: Joel Kiff

2795 2nd St., Suite 300 Davis, CA 95616 530-297-4800

Report Number : 41674

Date : 1/4/2005

QC Report : Method Blank Data

Project Name : **Dave's 76**

Project Number : **NC-20**

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
TPH as Diesel (Silica Gel)	< 50	50	ug/L	M EPA 8015	12/27/2004
Benzene	< 0.50	0.50	ug/L	EPA 8260B	12/30/2004
Toluene	< 0.50	0.50	ug/L	EPA 8260B	12/30/2004
Ethylbenzene	< 0.50	0.50	ug/L	EPA 8260B	12/30/2004
Total Xylenes	< 0.50	0.50	ug/L	EPA 8260B	12/30/2004
Methyl-t-butyl ether (MTBE)	< 0.50	0.50	ug/L	EPA 8260B	12/30/2004
TPH as Gasoline	< 50	50	ug/L	EPA 8260B	12/30/2004
Toluene - d8 (Surr)	99.3		%	EPA 8260B	12/30/2004
4-Bromofluorobenzene (Surr)	105		%	EPA 8260B	12/30/2004

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed

Approved By: Joel Kiff

KIFF ANALYTICAL, LLC

2795 2nd St, Suite 300 Davis, CA 95616 530-297-4800

Report Number : 41674

Date : 1/4/2005

QC Report : Matrix Spike/ Matrix Spike Duplicate

Project Name : **Dave's 76**

Project Number : **NC-20**

Parameter	Spiked Sample	Sample Value	Spike Level	Spike Dup. Level	Spiked Sample Value	Duplicate Spiked Sample Value	Units	Analysis Method	Date Analyzed	Spiked Sample Percent Recov.	Duplicate Spiked Sample Percent Recov.	Relative Percent Diff.	Spiked Sample Percent Recov. Limit	Relative Percent Diff. Limit
TPH as Diesel	Blank	<50	1000	1000	993	1020	ug/L	M EPA 8015	12/27/04	99.3	102	3.10	70-130	25
Benzene	41678-01	190	40.0	40.0	214	210	ug/L	EPA 8260B	12/30/04	63.5	54.5	15.3	70-130	25
Toluene	41678-01	5.4	40.0	40.0	43.8	43.6	ug/L	EPA 8260B	12/30/04	96.0	95.6	0.456	70-130	25
Tert-Butanol	41678-01	<5.0	200	200	197	192	ug/L	EPA 8260B	12/30/04	98.3	95.9	2.53	70-130	25
Methyl-t-Butyl Ether	41678-01	14	40.0	40.0	57.6	54.7	ug/L	EPA 8260B	12/30/04	110	103	6.68	70-130	25

Approved By: Joel Kiff

KIFF ANALYTICAL, LLC

2795 2nd St, Suite 300 Davis, CA 95616 530-297-4800

Report Number : 41674

Date : 1/4/2005

QC Report : Laboratory Control Sample (LCS)

Project Name : **Dave's 76**

Project Number : **NC-20**

Parameter	Spike Level	Units	Analysis Method	Date Analyzed	LCS Percent Recov.	LCS Percent Recov. Limit
Benzene	40.0	ug/L	EPA 8260B	12/30/04	100	70-130
Toluene	40.0	ug/L	EPA 8260B	12/30/04	101	70-130
Tert-Butanol	200	ug/L	EPA 8260B	12/30/04	94.9	70-130
Methyl-t-Butyl Ether	40.0	ug/L	EPA 8260B	12/30/04	107	70-130

Approved By: Joel Kiff

KIFF ANALYTICAL, LLC

2795 2nd St, Suite 300 Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

2795 2nd Street, Suite 300
Davis, CA 95616
Lab: 530.297.4800
Fax: 530.297.4808

Lab No. 41674 Page ____ of ____

Chain-of-Custody Record and Analysis Request

Project Contact (Hardcopy or PDF To): Andrew Lolicero

California EDF Report? ☐ Yes ☒ No

Company/Address: Blue Rock Environ. 535 3rd St #100 Eureka CA 95501

Recommended but not mandatory to complete this section:
Sampling Company Log Code: . . .
Global ID: . . . . . .
EDF Deliverable To (Email Address):

Phone No.: 707 441 1934 FAX No.: 707 441 1949

Project Number: NC-20 P.O. No:

Project Name: Dave's 76

Sampler Signature: A. Lol

Project Address: 1666 Main St. Fortuna CA

Sample Designation	Sampling Date	Sampling Time	Container: 40 ml VOA	Container: SLEEVE	Preservative: HCl	Preservative: HNO_3	Preservative: ICE	Preservative: NONE	Matrix: WATER	Matrix: SOIL	BTEX (8021B)	BTEX/TPH Gas/MTBE (8021B/M8015)	TPH as Diesel (M8015) Si. Gel C-14	TPH as Motor Oil (M8015)	TPH Gas/BTEX/MTBE (8260B)	5 Oxygenates/TPH Gas/BTEX (8260B)	7 Oxygenates/TPH Gas/BTEX (8260B)	5 Oxygenates (8260B)	7 Oxygenates (8260B)	Lead Scav. (1,2 DCA & 1,2 EDB - 8260B)	EPA 8260B (Full List)	Volatile Halocarbons (EPA 8260B)	Lead (7421/239.2) TOTAL (X) W.E.T. (X)	TAT: 12 hr/24 hr/48 hr/72 hr/(wk)	For Lab Use Only
EX-1 Int #1	12/20/04	1400	6		X		X		X				4		4									4	01
EX-1 Int #2	12/20/04	1600	6		X		X		X				4		4									4	02

Relinquished by: A. Lol C — Date 12/21/04 — Time 1100 — Received by: FED EX

Relinquished by: — Date — Time — Received by:

Relinquished by: — Date 122204 — Time 1226 — Received by Laboratory: B. A. B — KFF Analytical

Remarks: The samples arrived on wet ice via fed ex @1035. The temp was 2.9°C using IR-1. BAB 122204 1226

Bill to: Foster City

Distribution: White - Lab, Pink - Originator

Forms/coc 121001.fh9